

**CLAIMS:**

What is claimed is:

1. A method for coding a code division multiple access signal based on Go-CDMA codes,  
comprising:
  - 5 providing majority logic coding blocks, each block comprising a Go-CDMA matrix;  
coding a data message based on the majority coding blocks; and  
transmitting the coded data message over a communication channel.
- 10 2. The method according to claim 1, wherein the majority coding blocks comprise a single  
coding stage.
- 15 3. The method according to claim 1, wherein the majority coding blocks comprise at least two  
coding stages.
- 20 4. The method according to claim 1, wherein the majority coding blocks comprise at least three  
coding stages.
5. The method according to claim 1, wherein the majority coding blocks comprise more than  
three coding stages.
6. The method according to claim 1, further comprising coding a plurality of data messages  
based on the majority coding blocks.

7. The method according to claim 6, wherein at least one of the data messages is associated with an active user.

8. The method according to claim 6, wherein at least one of the data messages is associated with a pseudo active user.

9. The method according to claim 6, wherein at least one of the data messages is associated with an inactive user.

10. The method according to claim 3, further comprising a permutation stage between each of at least one adjacent pair of the coding stages.

11. The method according to claim 4, further comprising a permutation stage between each of at least one adjacent pair of the coding stages.

12. The method according to claim 5, further comprising at least one permutation stage between each of at least adjacent pair of the coding stages.

13. The method according to claim 1, wherein the data message comprises data message elements in polar binary format.

14. The method according to claim 1, wherein the data message comprises data message elements in ternary format, or higher order formats.

15. The method according to claim 6, wherein each of the plurality of data messages is based on data received from an intermittent data source.

16. The method according to claim 1, wherein the majority coding logic blocks are implemented as a look up table and wherein the coding is performed based on the look up table.

17. The method according to claim 2, wherein the majority coding logic blocks are implemented as a look up table and wherein the coding is performed based on the look up table.

18. The method according to claim 3, wherein the majority coding logic blocks are implemented as a look up table and wherein the coding is performed based on the look up table.

19. The method according to claim 1, wherein the Go-CDMA matrices allow the introduction of at least some deterministic errors.

20. The method according to claim 2, wherein the Go-CDMA matrices allow the introduction of at least some deterministic errors.

21. The method according to claim 3, wherein the Go-CDMA matrices allow the introduction of at least some deterministic errors.

22. A method for decoding a code division multiple access signal based on Go-CDMA codes, comprising:

receiving a signal over a communication channel;  
providing majority logic decoding blocks, each block comprising a Go-CDMA matrix;  
and  
decoding a data message from the signal based on the majority coding blocks.

5

23. The method according to claim 22, wherein the majority coding blocks comprise a single decoding stage.

24. The method according to claim 22, wherein the majority coding blocks comprise at least two decoding stages.

25. The method according to claim 22, wherein the majority coding blocks comprise at least three decoding stages.

26. The method according to claim 22, wherein the majority coding blocks comprise more than three decoding stages.

27. The method according to claim 22, further comprising decoding a plurality of data messages from the signal based on the majority coding blocks.

28. The method according to claim 27, wherein at least one of the data messages is associated with an active user.

29. The method according to claim 27, wherein at least one of the data messages is associated with a pseudo active user.

30. The method according to claim 27, wherein at least one of the data messages is associated with an inactive user.

31. The method according to claim 24, further comprising a permutation stage between each of at least one adjacent pair of the coding stages.

32. The method according to claim 25, further comprising a permutation stage between each of at least one adjacent pair of the coding stages.

33. The method according to claim 26, further comprising at least one permutation stage between each of at least adjacent pair of the coding stages.

34. The method according to claim 22, wherein the data message comprises data message elements in polar binary format.

35. The method according to claim 22, wherein the data message comprises data message elements in ternary format, or higher order formats.

36. The method according to claim 27, wherein each of the plurality of data messages is based on data received from an intermittent data source.

37. The method according to claim 22, wherein the majority coding logic blocks are implemented as a look up table and wherein the coding is performed based on the look up table.

5

38. The method according to claim 23, wherein the majority coding logic blocks are implemented as a look up table and wherein the coding is performed based on the look up table.

10 39. The method according to claim 24, wherein the majority coding logic blocks are implemented as a look up table and wherein the coding is performed based on the look up table.

15 40. The method according to claim 22, wherein the Go-CDMA matrices allow the introduction of at least some deterministic errors.

41. The method according to claim 23, wherein the Go-CDMA matrices allow the introduction of at least some deterministic errors.

20 42. The method according to claim 24, wherein the Go-CDMA matrices allow the introduction of at least some deterministic errors.

43. A method for providing a code division multiple access signal, comprising:

coding at least one data message stream based on Go-CDMA codes; and  
transmitting the coded message stream over a communication channel.

44. The method according to claim 43, wherein the coding includes coding based on majority  
5 logic coding blocks.

45. The method according to claim 43, wherein the method is executed at a mobile  
communication unit.

46. The method according to claim 43, wherein the method is executed at a base station.

47. The method according to claim 43, further comprising:  
receiving at least one coded data message stream over a communication channel; and  
decoding the at least one data message stream based on Go-CDMA codes.

48. A method for decoding a code division multiple access signal, comprising:  
receiving at least one coded data message stream over a communication channel; and  
decoding the at least one data message stream based on Go-CDMA codes.

49. The method according to claim 48, wherein the decoding includes decoding based on  
majority logic coding blocks.

50. The method according to claim 48, wherein the method is executed at a mobile communication unit.

51. The method according to claim 48, wherein the method is executed at a base station.

5

52. A method for providing a code division multiple access signal, comprising:

coding at least one data message stream based on Go-CDMA codes;

scrambling the coded data message stream based on random codes; and

transmitting the scrambled coded message stream over a communication channel.

53. The method according to claim 52, wherein a plurality of data message streams are coded, scrambled and transmitted.

54. The method according to claim 53, wherein the method is executed at a mobile communication unit.

55. The method according to claim 54, wherein the data message streams are related.

56. The method according to claim 54, wherein the data message streams are not related.

20

57. The method according to claim 54, wherein the data message streams represent a serial data stream.



58. The method according to claim 53, wherein the method is executed at a base station.

59. The method according to claim 58, wherein the data message streams are associated with different mobile units.

5

60. The method according to claim 59, wherein the data message streams are associated with at least one of the mobile units includes multiple data streams.

61. The method according to claim 58, further comprising:

coding at least some of the data message streams based on non-Go-CDMA codes;  
scrambling the non-Go-CDMA coded data message streams based on random codes; and  
transmitting the scrambled non-Go-CDMA coded data message streams along with the  
Go-CDMA coded data message streams over a communication channel.

62. The method according to claim 52, further comprising:

receiving the scrambled coded message stream over a communication channel;  
descrambling the coded data message stream based on the random codes and  
identification information identifying the random codes; and  
decoding the data message stream based on the Go-CDMA codes.

20

63. The method according to claim 62, further comprising:

determining the identification information based on data in a pilot signal.

64. The method according to claim 61, further comprising:

receiving the scrambled coded message stream over a communication channel;

descrambling the non-Go-CDMA coded data message streams and the Go-CDMA coded data message streams based on the random codes and identification information identifying the random codes;

separating the non-Go-CDMA coded data message streams from the Go-CDMA coded data message streams based on the identification information; and

separately decoding the non-Go-CDMA coded data message streams and the Go-CDMA coded data message streams.

65. A method according to claim 63, further comprising:

transmitting a plurality of coded data streams without allocating a data stream for controlling signal characteristics.

66. A computer program product for causing a system to provide a code division multiple access signal, the computer program product comprising a computer useable medium having computer program logic therein, the computer program logic comprising:

coding means for causing the system to code at least one data message stream based on Go-CDMA codes;

scrambling means for causing the system to scramble the coded data message stream based on random codes; and

transmitting means for causing the system to transmit the scrambled coded message stream over a communication channel.

67. The computer program product according to claim 66, wherein the computer program logic causes the system to code, scramble and transmit a plurality of data message streams.

5 68. The computer program product according to claim 67, wherein the system is a mobile communication unit.

69. The computer program product according to claim 68, wherein the data message streams are related.

70. The computer program product according to claim 68, wherein the data message streams are not related.

71. The computer program product according to claim 68, wherein the data message streams represent a serial data stream.

72. The computer program product according to claim 67, wherein the system is a base station.

20 73. The computer program product according to claim 72, wherein the data message streams are associated with different mobile units.

74. The computer program product according to claim 73, wherein the data message streams associated with at least one of the mobile units includes multiple data streams.

75. The computer program product according to claim 72 further comprising:

coding means for causing the system to code at least some of the data message streams based on non-Go-CDMA codes;

5 scrambling means for causing the system to scramble the non-Go-CDMA coded data message streams based on random codes; and

transmitting means for causing the system to transmit the scrambled non-Go-CDMA coded data message streams along with the Go-CDMA coded data message streams over a communication channel.

76. A method of decoding a code division multiple access signal, comprising:

receiving a scrambled coded data message stream over a communication channel;  
descrambling the coded data message stream based on random codes and identification information identifying the random codes; and

15 decoding the data message stream based on Go-CDMA codes.

77. The method according to claim 76, further comprising:

determining the identification information based on data in a pilot signal.

20 78. The method according to claim 76, wherein a plurality of data message streams are received, descrambled and decoded.

79. The method according to claim 78, wherein the method is executed at a mobile communication unit.

80. The method according to claim 79, wherein the data message streams are related.

5

81. The method according to claim 79, wherein the data message streams are not related.

82. The method according to claim 79, wherein the data message streams represent a serial data stream.

83. The method according to claim 78, wherein the method is executed at a base station.

84. The method according to claim 83, wherein the data message streams are associated with different mobile units.

85. The method according to claim 84, wherein the data message streams associated with at least one of the mobile units includes multiple data streams.

86. The method according to claim 84, wherein some of the data streams received have been coded using non-Go-CDMA coding.

87. The method according to claim 86, further comprising:  
receiving the scrambled coded message stream over a communication channel;

descrambling the non-CDMA coded data message streams and the Go-CDMA coded data message streams based on the random codes and identification information identifying the random codes;

separating the non-CDMA coded data message streams from the Go-CDMA coded data message streams based on the identification information; and

separately decoding the non-Go-CDMA data message streams and the Go-CDMA data message streams.

88. A computer program product for causing a system to decode a code division multiple access signal, the computer program product comprising a computer useable medium having computer program logic therein, the computer program logic comprising:

receiving means for causing the system to receive a scrambled coded data message stream over a communication channel;

descrambling means for causing the system to descramble the coded data message stream based on random codes and identification information identifying the random codes; and

decoding means for causing the system to decode the data message stream based on Go-CDMA codes.

89. The computer program product according to claim 88, further comprising:

determining means for causing the system to determine the identification information based on data in a pilot signal.

90. The computer program product according to claim 88, wherein the computer program product causes the system to receive, descramble and decode a plurality of data message streams.

5 91. The computer program product according to claim 90, wherein the system is a mobile communication unit.

92. The computer program product according to claim 91, wherein the data message streams are related.

93. The computer program product according to claim 91, wherein the data message streams are not related.

94. The computer program product according to claim 91, wherein the data message streams represent a serial data stream.

95. The computer program product according to claim 90, wherein the system is a base station.

96. The computer program product according to claim 95, wherein the data message streams are associated with different mobile units.

97. The computer program product according to claim 96, wherein the data message streams associated with at least one of the mobile units includes multiple data streams.

98. The computer program product according to claim 96, wherein some of the data streams received have been coded using non-Go-CDMA coding.

5 99. The computer program product according to claim 98, further comprising:

receiving means for causing the system to receive the scrambled coded message stream over a communication channel;

descrambling means for causing the system to descramble the non-Go-CDMA coded data message streams and the Go-CDMA coded data message streams based on the random codes and  
10 identification information identifying the random codes;

separating means for causing the system to separate the non-Go-CDMA coded data message streams from the Go-CDMA coded data message streams based on the identification information; and

separately decoding means for causing the system to separately decode the non-Go-  
15 CDMA data message streams and the Go-CDMA data message streams.

100. A system for providing a code division multiple access signal, comprising:

a memory including program instructions and data corresponding to at least one data stream;

20 a modulation unit for modulating a signal; and

a processor coupled to the memory and the modulation unit, the processor executing the program instructions to a) code at least one data message stream based on Go-CDMA codes, b) scramble the coded data message stream based on random codes, and c) cause the modulation



unit to modulate the scrambled coded message stream for transmission over a communication channel.

101. The system according to claim 100, wherein the memory and the modulation unit are part  
5 of the processor.

102. The system according to claim 100, wherein a plurality of data message streams are coded, scrambled and modulated.

103. The system according to claim 102, wherein the system is part of a mobile  
communication unit.

104. The system according to claim 103, wherein the data message streams are related.

105. The system according to claim 103, wherein the data message streams are not related.

106. The system according to claim 103, wherein the data message streams represent a serial data stream.

107. The system method according to claim 102, wherein the system is a base station.

108. The system according to claim 107, wherein the data message streams are associated with different mobile units.

109. The system according to claim 108, wherein the data message streams associated with at least one of the mobile units includes multiple data streams.

5 110. The system according to claim 108 wherein the processor further: d) codes at least some of the data message streams based on non-Go-CDMA codes, e) scrambles the, non-Go-CDMA coded data message streams based on random codes, and f) modulates the scrambled non-Go-CDMA coded data message streams along with the Go-CDMA coded data message streams.

10 111. A system for decoding a code division multiple access signal, comprising:  
a memory including program instructions and data;  
a demodulation unit for modulating a signal; and  
a processor coupled to the memory and the modulation unit, the processor executing the  
15 program instructions to a) receive a scrambled coded data message stream over a communication channel, b) descramble the coded data message stream based on random codes and identification information identifying the random codes, and c) decode the data message stream based on Go-CDMA codes.

20 112. The system according to claim 111, wherein the processor further determines the identification information based on data in a pilot signal.

113. The system according to claim 111, wherein the processor receives, descrambles and decodes a plurality of data message streams.

114. The system according to claim 113, wherein the system is part of a mobile communication unit.

115. The system according to claim 114, wherein the data message streams are related.

116. The system according to claim 114, wherein the data message streams are not related.

117. The system according to claim 114, wherein the data message streams represent a serial data stream.

118. The system according to claim 113, wherein the system is part of a base station.

119. The system according to claim 118, wherein the data message streams are associated with different mobile units.

120. The system according to claim 119, wherein the data message streams associated with at least one of the mobile units includes multiple data streams.

121. The method according to claim 119, wherein some of the data streams received have been coded using non-Go-CDMA coding.

122. The system according to claim 121, wherein the processor further: d) receives the  
scrambled coded message stream over a communication channel, e) descrambles the non-  
CDMA coded data message streams and the Go-CDMA coded data message streams based  
5 on the random codes and identification information identifying the random codes, f)  
separates the non-CDMA coded data message streams from the Go-CDMA coded data  
message streams based on the identification information, and g) separately decodes the non-  
Go-CDMA data message streams and the Go-CDMA data message streams.